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Mr. Dane Ericksen
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Dear Dane,

Concerning the overload threat from PCS, the attached data sheet for our new Millennium CR Central Receiver may be of help. Please remember, this is the latest and most advanced receiver on the market. Older models (ours and other brands) will not have comparable numbers for adjacent channel rejection and/or dynamic range. Let's make some assumptions. If the interfering transmitter was on an adjacent tower 100 feet away and the ENG steerable antenna happened to be looking right at it:

1) Received signal level into the ENG antenna (excluding near-field coupling and reflections) would be EIRP-FSL or $62.04 - 68.17 = -6.13\text{dBm}$.

2) ENG antenna gains are in the order of 20-26dB. So we are looking at an input signal level into the antenna-mounted LNA of at least $+13\text{dBm}$. Most LNA's are in compression at this point. Bypassing the antenna-mounted LNA is not a solution. Most stations run with the LNA in except for local shots.

3) Most ENG receivers have a dynamic range from -25dBm to -85dBm . Ours will offer 60dB rejection to a signal 9.5 MHz away. Others will not be as good. With the LNA bypassed, our receiver will handle in-band signals as loud as -20dB . Without benefit of an exotic (and expensive) RF filter to attenuate the PCS signal, the front-end of our receiver will definitely overload.

In summary, without a healthy guard band, most or all existing ENG receive systems will be rendered useless by the presence of a local PCS station.

Sincerely yours,

Microwave Radio Corporation


Carl Guastaferrro
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MILLENNIUM SERIES

Millennium CR Central Receiver Wideband and Dualband 2/7 or 2/13 GHz

Features

- Dual down conversion frequency synthesized local oscillators
- Superior adjacent channel rejection
- Choice of Wideband and Dualband models:
 - 1.99–2.11 & 2.45–2.5 GHz, 10 channels plus offsets
 - 6.4–7.1 GHz, 14 channels plus offsets
 - 12.7–13.2 GHz, 20 channels plus offsets
- Remote control capability
- Low noise pre-amplifier standard
- Selectable IF bandwidths
- Filtered and composite video outputs
- 70 MHz IF output
- Two audio channels standard, four audios optional



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Video Microwave Radio for Central Receive Systems

THE MILLENNIUM CR IS A HIGH-PERFORMANCE, RACK-MOUNTED receiver that supports dualband 2/7 or 2/13 GHz operation. This dual-conversion receiver has been designed especially for operation in crowded RF environments where undesired adjacent signals may be significantly stronger than the desired signal.



The Millennium CR achieves superior performance through the use of state-of-the-art design techniques and components. Excellent threshold and sensitivity specifications are achieved through the use of a built-in low noise amplifier. The Millennium CR is equipped with two switchable IF filters. Operating channel, IF filter selection, and other key functions can be remotely controlled. Microwave Radio offers the Millennium CR in a number of frequency bands to cover both the U.S. broadcast and government channel allocations, as well as the international CCIR 2, 7, and 13 GHz frequency allocations.

The Millennium CR receiver features several different IF filter options, ranging from a highly selective narrow band filter (10 MHz bandwidth) that would be used under crowded U.S. ENG conditions when the "shot must get through," to wider bandwidth filters that provide full CCIR performance. Depending upon interference conditions, two filters can be selected, either separately or in cascade. When the narrow band filters are "switched in," the Millennium CR provides more than 60 dB of rejection at ± 10 MHz.

Microwave Radio Corporation offers the Millennium CR in both 525 (NTSC) line and 625 line (CCIR/PAL/SECAM) models. The standard Millennium CR includes two program audio channels, with optional capacity for four audio channels.

Millennium CR Central Receiver Specifications

GENERAL

Type: Superheterodyne, dual conversion
 Radio Capacity: 525/625 line video, four audio channels
 Frequency Bands*:
 Standard: 1.99-2.1 & 2.45-2.5 GHz, 10 channels plus offsets
 Optional: 6.4-7.1 GHz, 14 channels plus offsets
 12.7-13.2 GHz, 20 channels plus offsets

*Other frequencies and channel plans available on special order.

Local Oscillator: Digital frequency synthesizer (first L.O.)
 Phase locked (second L.O.)

Frequency Stability: $\pm 0.005\%$ (2 GHz receiver)
 First IF Frequency: 744 MHz
 First IF Bandwidth: 30 MHz
 Second IF Frequency: 70 MHz
 Second IF Bandwidth: 2 switchable bandwidths standard
 Optional: 10, 15, 20, or 30 MHz BW filter
 Receiver Noise Figure: 2.0 dB typical, 2.5 dB maximum
 Receiver Selectivity (typ)
 10 and 15 MHz Filters: $-3 \text{ dB} \pm 6 \text{ MHz}$; $-60 \text{ dB} \pm 9.5 \text{ MHz}$
 15 MHz Filter: $-3 \text{ dB} \pm 7.5 \text{ MHz}$; $-60 \text{ dB} \pm 19 \text{ MHz}$
 20 MHz Filter: $-3 \text{ dB} \pm 10 \text{ MHz}$; $-60 \text{ dB} \pm 22 \text{ MHz}$
 30 MHz Filter: $-3 \text{ dB} \pm 14 \text{ MHz}$; $-60 \text{ dB} \pm 32 \text{ MHz}$

Video Output (4.25 or 5.5

 MHz filter optional): 1 Vp-p for $\pm 4 \text{ MHz}$ deviation

Baseband Output (wideband): 1 Vp-p for $\pm 4 \text{ MHz}$ deviation

IF Output (70 MHz): $+3 \text{ dBm} \pm 3 \text{ dB}$

Audio Subcarriers: Two standard (4.83, 5.8, 6.2, 6.8, 7.5, 8.3
 or any CCIR frequency)**

 Optional: A total of four internal audio subcarriers

**When 10 MHz IF bandwidth is switched in, only specifications on
 4.83 MHz subcarrier is guaranteed. When 15 MHz is used, only
 4.83-6.8 MHz audio specification is guaranteed.

VIDEO PERFORMANCE

Emphasis: Standard CCIR 525 or 625 line

Frequency Response

Video Output (with 4.2 MHz video
 filter and 15 MHz IF bandwidth): 10 kHz-4.2 MHz $\pm 0.25 \text{ dB max.}$

Video Output (with 5.5 MHz video
 filter and 15 MHz IF bandwidth): 10 kHz-5.5 MHz $\pm 0.25 \text{ dB max.}$

Baseband Output: 10 kHz-8 MHz $\pm 0.5, -3 \text{ dB max.}^*$

IF Filter:	10 MHz	15 MHz	20 MHz	30 MHz
Signal-to-Noise:	68 dB min.	68 dB min.	68 dB min.	68 dB min.
Signal-to-Hum:	65 dB min.	65 dB min.	65 dB min.	65 dB min.
Differential Phase:	3° typ.	1° max.	0.5° max.	0.5° max.
Differential Gain:	6% typ.	1% max.	1% max.	1% max.
Field Tilt:	1% max.	1% max.	1% max.	1% max.
Chroma Delay:	$\pm 30 \text{ ns}$	$\pm 20 \text{ ns}$	$\pm 20 \text{ ns}$	$\pm 20 \text{ ns}$
Chroma Gain:	5% typ.	4% max.	2% max.	2% max.

* With 30 MHz IF Filter.

AUDIO PERFORMANCE

Frequency Response

50 Hz to 15 kHz: $\pm 1.5 \text{ dB maximum}^{***}$

50 Hz to 10 kHz: $\pm 0.5 \text{ dB maximum}$

*** Audio response includes a 15 kHz low pass/notch filter, which improves
 the audio S/N. This filter can be removed on special order if a wider
 bandwidth or flat audio channel is required.

Harmonic Distortion

 @ 75 kHz Peak Deviation: 0.5% maximum

 @ 200 kHz Peak Deviation: 2.0% maximum

De-emphasis, Standard: 75 μs

 Optional: 50 μs or flat

Output Level

1 kHz TT @ 75 kHz Pk Deviation: Adjustable, 0 to $+9 \text{ dBm}$

 Factory preset: $+9 \text{ dBm}$

Impedance, Standard: 600 Ω balanced

 Optional: 150 Ω or 50 Ω

Signal-to-Noise Ratio: 70 dB minimum

Ref: 75 kHz peak deviation with pulse and bar video test signal @ -40 dBm RCL

REMOTE CONTROL FUNCTIONS

Signal strength, squelch, channel selection, IF bandwidth,
 local remote, alarm

POWER REQUIREMENTS

115/230 Vac $\pm 13\%$ (50/60 Hz), 50 to 400 kHz at 50 Watts

PHYSICAL CHARACTERISTICS

Size: 5.25" h x 19" w x 15.4" d

(13.3 x 48.3 x 39.3 cm)

Weight: 25 lbs. (11.4 kg)

ENVIRONMENTAL

Temperature, Operating: $-20^\circ \text{ to } +55^\circ \text{C}$

 Full Specifications: $+10^\circ \text{ to } +40^\circ \text{C}$

Relative Humidity: 98% ($+10^\circ \text{ to } +40^\circ \text{C}$)

Altitude, Operating: 15,000 ft. (4,500 m)

Storage: 50,000 ft. (15,000 m)

PART NUMBER

903501-1	Millennium CR Central Receiver, 2 GHz
903501-2	Millennium CR Central Receiver, 2/7 GHz
903501-3	Millennium CR Central Receiver, 2/13 GHz

All specifications subject to change without notice.

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